



UNDERGRADUATE THESIS

**BLOCKCHAIN AND SMART CONTRACT
BASED CROWDFUNDING APPLICATION
USING ETHEREUM LAYER 2**

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INFORMATICS STUDY PROGRAM
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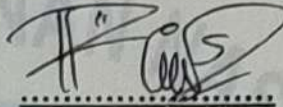
BLOCKCHAIN AND SMART CONTRACT BASED CROWDFUNDING
APPLICATION USING ETHEREUM LAYER 2

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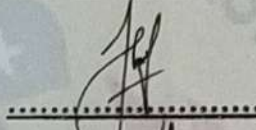
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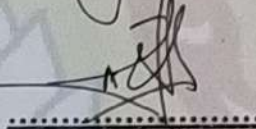
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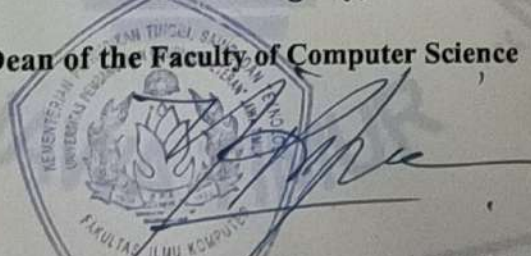
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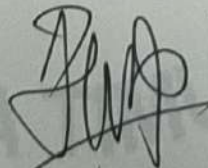
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ABSTRACT

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Application Using Ethereum Layer 2
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Conventional crowdfunding systems currently face challenges such as data centralization, the risk of fund misuse, and high operational costs, which result in limited transparency and accountability in public fund management. Although blockchain technology and smart contracts are capable of providing transparent and publicly auditable funding mechanisms, direct implementation on the Ethereum Layer 1 network faces efficiency hurdles due to high transaction costs (gas fees). This research aims to design and implement a crowdfunding application named OpenFund that utilizes Ethereum Layer 2 technology, specifically the Base Sepolia network based on Optimistic Rollup, as a solution to reduce transaction costs without compromising data security and transparency. The study was conducted through an empirical comparative analysis between the Ethereum Sepolia (Layer 1) and Base Sepolia (Layer 2) networks.

The testing phase encompasses system functionality verification using Black Box Testing methods and transaction cost (gas fee) testing of the crowdfunding application's core smart contract functions. Testing results indicate that the OpenFund application successfully executed the entire operational cycle stably. Based on the testing results, it was found that gas fees on the Base Sepolia network (Layer 2) were consistently lower than those on Ethereum Sepolia (Layer 1). An average efficiency range of 99.61% to 99.77% was derived from the comparison of transaction cost data across multiple tests conducted at different times. Nevertheless, these values represent averages of data obtained within a testnet environment and do not reflect identical averages in a mainnet environment. Therefore, these results are interpreted as an indication of relative efficiency trends rather than fixed outcomes applicable to all network environments.

Keywords: Blockchain, Smart Contract, Crowdfunding, Ethereum, Layer 2, Base.

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The author realizes that in the preparation of the following thesis there are many shortcomings. For this reason, constructive criticism and suggestions from all parties are highly expected for the perfection of writing the following thesis.

Surabaya, May 22th 2026

Author

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